

Grass as a Biomass

Written by GEF Staff



Grades: 3-5

Subjects: Science, Social Studies

Time: 45 minutes

*** Standards:** Students will...

Science Standard 9: Understand the sources and properties of energy.

Benchmark # 1: Know that heat is often produced as a byproduct when one form of energy is converted to another form (e.g., biomass produces natural gas that can heat homes, create electricity, and fuel automobiles).

Science Standard 12: Understand the nature of scientific inquiry.

Benchmark # 3: Plan and conduct simple investigations.

Benchmark # 4: Use appropriate tools and simple equipment (e.g., scale) to gather scientific data and extend the senses.

Technology Standard 6: Understand the nature and uses of different forms of technology.

Benchmark # 3: Know that different types of energy (e.g., biomass, solar, fossil fuels) have different advantages and disadvantages (e.g., solar is a cleaner source of energy than fossil fuels, but currently is more expensive), and that regardless of the source of energy, the technological design should attempt to maximize the use of it.

Geography Standard 16: Understand the changes that occur in the meaning, use, distribution and importance of resources.

Benchmark # 1: Know the characteristics and uses of renewable resources (e.g., water, wind, biomass) and non-renewable resources (e.g., fossil fuels).

Please click [here](#) to view both the creative artwork for this great lesson and the downloadable PDF.

Objectives: Students will be able to...

- Identify biomass as a form of renewable energy, describe it and how it can be used.
- Explain the advantages of using biomass rather than fossil fuels.

Materials:

- Milk cartons recycled and reused
- Popsicle sticks
- Scissors
- Potting soil
- Rye, corn and whole oat seeds
- Observation chart provided below

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- "Grass as Biomass Hypothesis/Conclusions Chart" provided below
- Pencils
- Permanent marker

Overview: Unlike non-renewable fossil fuels, which damage the environment and lead to climate change, renewable energy is obtained from natural, replenishing sources. Cow manure, dead plants, rotting foods, and nutshells, anything organic, are examples of a specific renewable energy called biomass. Biomass produces natural gas called bio-gas. Bio-gas can heat homes, create electricity, and fuel automobiles.

Kid's Speak: Cow manure, dead plants, rotting foods, and nutshells are biomasses, and they produce a natural gas called bio-gas. Bio-gas can heat homes, create electricity, fuel automobiles, and help reduce our dependence on harmful fossil fuels.

Eco-Fact: Some dairy farmers collect bio-gas in tanks called digesters from the muck and manure in their barns.

Procedures:

Before Growing Biomass Grass:

- Explain the meaning of biomass to students. Ask students to name different examples of biomass and record student responses on the board.
- Tell students that they are going to grow a biomass– grass. Explain that they will be growing rye, corn, and whole oats for 15 days to see which produces the greatest amount of biomass.
- Ask student to form a hypothesis. Have students draw a picture and describe on the worksheet provided what they think will happen to their seeds after 15 days.

Growing Biomass:

1. Divide the class into groups of three to five students, and give each group a pair of scissors, a milk carton, and three Popsicle sticks.

- 2. Students will cut the milk carton in half, so it can be used as a pot. Next, students will cut four drainage holes into the bottom of the pot.**
- 3. Students should fill their pots with soil.**
- 4. Give each group ten of each type seed.**
- 5. Have groups make labels for each seed types using the Popsicle sticks and marker.**
- 6. Plant the seeds separately and place each Popsicle stick into the dirt around the seed type it represents.**
- 7. Bring pots outside to a location that is not shaded by trees or buildings.**
- 8. For the next two weeks students will care for the seeds. Have them periodically observe the growth of their seeds and record their observations on the table provided at the bottom of the form below.**

After Growing Biomass:

- After 15 days have groups pick and weigh the product of each seed type and record the results.**
- From the observations and data they have recorded have students draw a picture and write their conclusions on the second half of the worksheet.**
- Students can also discuss the feasibility of using grass as a biomass and renewable energy source for the future.**

Adaptations: For lower grades, instead of writing conclusions students can draw a second picture showing the seeds actual growth.

Extensions: Read "Ethanol and Other New Fuels" by Tea Benduhn to learn more about renewable versus non-renewable resources, kinetic and potential energy, fossil fuels and pollution, global warming, and conservation.

GEF Community: Join the GEF Community! First, add your school, class or group as a GEF member. It just takes a minute and your students will learn about technology and social networking all in one. Use your class or group page to keep a record of your students' projects, ideas, and photos. You can share them with other schools across the nation. Simply complete the basic information and then join the Green Energy Challenge where you can share your grass growing experience by posting your class's pictures and essays.

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Name: _____

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Cow manure, dead plants, rotting foods, and nutshells are biomasses, and they produce a natural gas called bio-gas. Bio-gas can heat homes, create electricity, fuel automobiles, and help reduce our dependence on harmful fossil fuels.



Hypothesis

Directions: Draw a picture and describe what you think will happen to your seeds after 15 days.

Rye	Corn	Oats
		

Conclusion

Directions: Draw a picture and describe what has happened to your seeds after 15 days.

Rye	Corn	Oats
		

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